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MINERALOGY.—*Magnesioludwigite, a new mineral.*[1] B. S. BUTLER and W. T. SCHALLER, Geological Survey.

Introduction. In 1912, while making a reconnaissance examination of the Big and Little Cottonwood districts, Utah, one of the writers, B. S. Butler, collected specimens of the rather rare mineral ludwigite.[2] Specimens of this mineral from the Little Cottonwood district, in an undescribed collection made by J. M. Boutwell, were later examined.

During the summer of 1916 it was possible to make more detailed observations of the occurrence of the mineral, and chemical analysis has shown the presence of an allied mineral, hitherto undescribed, for which the name *magnesioludwigite* is proposed.

Locality. The largest body of ludwigite observed is at the Mountain Lake mine at the head of Big Cottonwood Canyon, about 1¼ miles south of Brighton. Ludwigite occurs in places to the southwest of the Mountain Lake mine for more than half a mile, nearly to Lake Catherine, and also to the east. It was collected on the south side of Little Cottonwood Canyon, southeast of the Michigan-Utah boarding house. It was observed

[1] Preliminary paper. Published with the permission of the Director of the U. S. Geological Survey.

[2] BUTLER, B. S., and LOUGHLIN, G. F. *A reconnaissance of the Cottonwood-American Fork mining region, Utah.* U. S. Geol. Survey Bull. 620, p. 201. 1915.

in rock débris near the Alta-Brighton trail north of Twin Lakes, and is abundant in the South Columbus tunnel of the South Hecla mine. It will doubtless be found at other localities in the district. Magnesioludwigite was found only in the Mountain Lake mine.

Occurrence. Ludwigite occurs as a replacement of limestone at or near the contact with intrusive rocks and is associated with "contact minerals," including magnetite, forsterite, garnet, diopside, muscovite, and sulphides of iron and copper. In the Mountain Lake deposit magnetite and forsterite are the most abundant original minerals associated with the ludwigite. All of the minerals were probably formed at the same time, though the presence of veinlets of magnetite in the ludwigite and in the forsterite indicates that the magnetite continued to form after the ludwigite and forsterite had ceased to form. The sulphides also, in part at least, were formed probably later than the ludwigite and forsterite.

In the Mountain Lake deposit the ludwigite is in finely fibrous crystals, forming radial and spherulitic groups which make up large masses of the mineral. These, as seen with the unaided eye or the hand lens, resemble tourmaline. There are exposed in the outcrop and on the dump many tons of a mixture of magnetite and ludwigite. The ludwigite occurs also as isolated crystals and groups of crystals in metamorphosed limestone, and from such occurrences well-defined crystals with natural crystal faces have been isolated and measured. The ludwigite is dull greenish black (Ridgway's color scale). In the outcrop of the deposit there is also much material of ivy-green color (Ridgway's color scale), which is the mineral for which the name magnesioludwigite is proposed. Its occurrence is like that of the ludwigite.

Composition. Chemical analysis has shown that only 2.55 per cent of ferrous oxide is present in the ivy-green mineral, whereas typical ludwigite contains 17.01 per cent ferrous oxide. The analysis has also determined that the formula of the new mineral is $MgO.Fe_2O_3.3MgO.B_2O_3$, in which a small amount of ferrous oxide replaces some of the magnesia. The analysis

can be interpreted as representing an isomorphous mixture of 85 per cent of magnesium borate with 15 per cent of ferrous borate. In its various properties magnesioludwigite shows the expected differences from those of the iron-richer ludwigite from Hungary. The luster is duller, the color lighter, the pleochroism and absorption weaker, and the translucency of the crushed material is markedly greater.

These various changes in properties are correlated with the changes in chemical composition, and the existence of a definite series from the ferrous-iron borate to the magnesium borate is well shown by specimens of the mineral from Hungary, Montana, and Utah. This correlation is being made and will be given in full in the detailed paper now in preparation.

The increased knowledge of the variation in chemical composition and corresponding variations in other properties makes it necessary to recognize the two end members of the series of the natural magnesium-iron borates. It is therefore proposed to use the name ludwigite as a group name, similarly to the usage of the terms mica and feldspar, and to introduce the two names magnesioludwigite and ferroludwigite for the end members and for those parts of the series in which the magnesium or the ferrous-iron borate, respectively, predominates.

Including the mineral pinakiolite in the group, the ludwigite group comprises then the following minerals, the term ludwigite being usable for any member of the group until its exact relation has been determined:

Group
Ludwigite
Species
Ferroludwigite, $FeO.Fe_2O_3.3MgO.B_2O_3$
Magnesioludwigite, $MgO.Fe_2O_3.3MgO.B_2O_3$
Pinakiolite, $MnO.Mn_2O_3.3MgO.B_2O_3$.

ANTHROPOLOGY.—*Significance of the terms for brother and sister among primitive peoples.* JOHN R. SWANTON, Bureau of American Ethnology.

It is well known that among tribes divided into clans or gentes the terms for those relations for which we use "brother"

and "sister" are extended to a large number of individuals of the same clan or gens and of approximately the same age as the speaker, but even experienced investigators are not so vividly conscious of the fact that they are by no means confined to that clan or gens. The idea of such a limitation is largely due to the fact that very many tribes, such for instance as the Iroquois, Choctaw, Chickasaw, Tlingit, Haida, and several of the Plains tribes, have only two exogamous groups, and that in such groups the men called collectively "fathers" are the husbands of the women called collectively "mothers." It happens, therefore, that the children of the father's brothers and the mother's sisters are the very same set of individuals and must always be of the exogamous division of the speaker and his own brothers and sisters. Thus it might be thought that the terms brother and sister were applied because the individuals so called were of the same clan or gens as self.

In order to discover the true reason for the application of these terms we must turn to tribes having three or more exogamous groups. Among peoples of this kind with matrilineal descent the men of the father's clan will be able to marry into two or more others and their children will be of the same number of clans, while if the descent is patrilineal the women of the mother's clan will have the same variety of choice. Now, if the terms for brother and sister are primarily clan or gentile terms, they will not be applied to children of the father's clan or the mother's gens *not of the clan or gens of the speaker*. If they are primarily consanguineal terms they will be so applied.

In the present article I shall not attempt an exhaustive study of this question but confine myself to an examination of the lists given by Morgan in his *Systems of Consanguinity and Affinity*[1] and those recorded by Rivers in *The History of Melanesian Society*. The internal diversity of the two regions, each of which presents examples of tribes with exogamous divisions and tribes without, tribes with matrilineal descent and tribes with patrilineal descent, tribes with dual divisions and tribes with multiple divisions, along with their remoteness from

[1] Smithsonian Contributions to Knowledge, vol. 17.

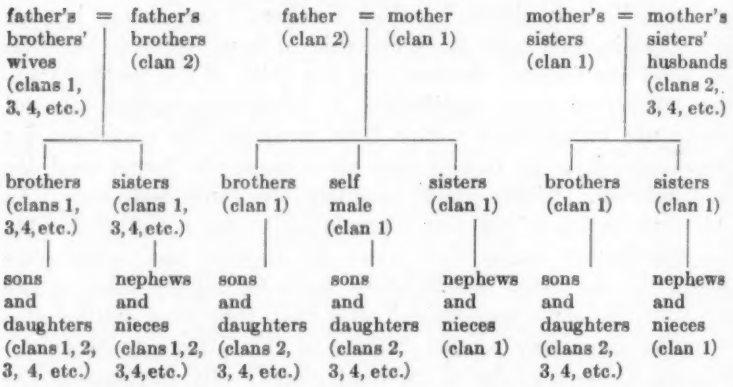
each other, and the difference in time and circumstance under which they were recorded, promises a very fair sample of what may be looked for in primitive society as a whole.

An inspection of the lists given by Morgan shows that the terms for brother and sister—elder and younger being also frequently distinguished—are employed by all tribes from which information is supplied except the Eskimo, who are without exogamous groups and therefore do not concern us. It is true that among certain peoples, such as the Chippewa, Ottawa, Potawatomi, Mohegan, Delaware, Spokane, and Creek, a distinction is introduced between the own brother and sister and collateral brothers and sisters, who are often called "step-brothers," "step-sisters," "other brothers," and so on; but we find that in most cases these exceptional terms apply to both the child of the father's brother and the child of the mother's sister; therefore their significance is mainly consanguineal and their use strengthens rather than weakens the argument for consanguinity. In one or two other cases the terms used are alternatives. Rivers yields precisely the same testimony. In his explanation of the terms employed in the island of Florida he specifically states that those for brother and sister were used "in the usual classificatory sense for all members of the clan of the same generation" and that they were applied also "in the same way to the children of the father's brothers, although these may be of different clans." By implication the same must be assumed in the systems recorded by him from the Torres Islands, Santa Cruz, the Reef Islands, Guadalcanar, Ysabel, and Savo, all of those in which there are more than two exogamous divisions and from which information is vouchsafed. The same is found, as we should expect, in tribes having two exogamous groups, and also in tribes without exogamous groups. In some cases these terms are so widely extended as to apply to the cross-cousins as well, the children of the father's sister and the mother's brother. The outstanding fact is, however, that the application of the terms for brother and sister is evidently governed by the relation of the parents of the persons so called to self.

Precisely the same thing appears in the succeeding generation, where the use of the terms son and daughter, and nephew and niece, is plainly determined by the status of the parents of those so denominated.

These facts may be illustrated by the accompanying diagram, in which it is to be understood that each English expression stands for a single native term. It supposes a tribe with several clans and matrilineal descent, self male. Other systems would involve a few simple and readily comprehended changes.

DIAGRAM ILLUSTRATING "BROTHER" AND "SISTER" RELATIONSHIPS.


father's brothers' wives (clans 1, 3, 4, etc.)
=
father's brothers (clan 2)
father (clan 2)
=
mother (clan 1)
mother's sisters (clan 1)
=
mother's sisters' husbands (clans 2, 3, 4, etc.)
brothers (clans 1, 3, 4, etc.)
sisters (clans 1, 3, 4, etc.)
brothers (clan 1)
self male (clan 1)
sisters (clan 1)
brothers (clan 1)
sisters (clan 1)
sons and daughters (clans 1, 2, 3, 4, etc.)
nephews and nieces (clans 1, 2, 3, 4, etc.)
sons and daughters (clans 2, 3, 4, etc.)
sons and daughters (clans 2, 3, 4, etc.)
nephews and nieces (clan 1)
sons and daughters (clans 2, 3, 4, etc.)
nephews and nieces (clan 1)

An examination of the remaining terms of relationship shows that almost the only ones which have a strictly clan or gentile connotation are those for father, mother, father's sister, and mother's brother. Those who argue for the priority of exogamous divisions to relationship terminology and for their clan rather than consanguineal significance are therefore reduced to the assumption that such divisions first determined the four terms last given and that all of the others were developed from them on purely consanguineal lines. But even in the case of these four terms we ordinarily find a distinction between the own father and mother and the clan or gentile father and mother, and frequently there are other exceptions to a strictly

clan usage of the terms. A theory which has to admit so many exceptions and which must grant the dominance of consanguineal considerations in all but a few cases may well be viewed with suspicion. It is certainly a clumsy device when compared with the alternative theory of a simple extension of terms founded on the idea of blood relationship to groups of persons hypothetically, though not actually, related.

ABSTRACTS

Authors of scientific papers are requested to see that abstracts, preferably prepared and signed by themselves, are forwarded promptly to the editors. Each of the scientific bureaus in Washington has a representative authorized to forward such material to this journal and abstracts of official publications should be transmitted through the representative of the bureau in which they originate. The abstracts should conform in length and general style to those appearing in this issue.

PHYSICS.—*A study of electromagnet moving coil galvanometers for use in alternating current measurements.* ERNEST WEIBEL. Bureau of Standards Scientific Paper No. 297 (Bull. Bur. Stds., **14**: 23-58). 1917.

This paper gives the results of a study of the electromagnet moving coil galvanometer that has led to the construction of instruments with sensitivities much greater than those previously obtained and equal to those of the best direct current moving coil galvanometers. The theory of the instrument is developed. The equation of motion is first expressed in terms of the intrinsic constants (the moment of inertia, the moment of damping, the moment of restoration, and the moment of displacement) and the deflection, velocity, acceleration, and current in the moving coil. The current is then known from the resultant electromotive force in the moving coil circuit and the latter's constants. It is necessary in computing the resultant electromotive force to consider not only the impressed but also the induced electromotive force. The latter is in part due to the motion of the coil in the magnetic field, causing electromagnetic damping, and in part due to the alternation of the flux linking with the coil, causing a current which results in a control torque in addition to that of the suspensions. The paper also contains descriptions and gives the performances of four instruments. The results indicate that the theory as given is fundamentally correct and therefore serves as a good basis for the design and use of instruments of this kind. E. W.

GEOLOGY.—*The lignite field of northwestern South Dakota.* DEAN E. WINCHESTER, C. J. HARES, E. RUSSELL LLOYD, and E. M. PARKS. U. S. Geological Survey Bulletin 627. Pp. 165, with 11 plates. 1916.

The report describes the geology and fuel resources of parts of Perkins and Harding counties in northwestern South Dakota. The

formations in the area include the Pierre, Fox Hills, Lance, Fort Union, White River, and Arikaree. The Lance is subdivided into three members: a lower undifferentiated portion, 425 feet thick; a middle or Ludlow lignite-bearing portion, 350 feet thick at most; and an upper marine member, the Cannonball, 225 feet thick.

The marine fauna of the Cannonball member is very similar to but not identical with the fauna of the Fox Hills, which is of recognized Cretaceous age, while the flora of the Ludlow lignitic member is so much like that of the Fort Union, which is of recognized Tertiary age, that it is impossible to differentiate it from the Fort Union on the basis of the fossil leaves.

Lignite beds are found in both the Lance and Fort Union formations, the more important beds occurring in the Lance formation.

D. E. W.

GEOLOGY.—*Reconnaissance of the Conconully and Ruby mining districts, Washington.* E. L. JONES, JR. U. S. Geological Survey Bulletin 640-B. Pp. i–iv, 11–36, with 1 plate. 1916.

This report describes the geology and ore deposits of a small area in the central part of Okanogan County, Washington. In general the rocks comprise an older series of metamorphic rocks and a younger series of igneous rocks of batholithic origin. The metamorphic rocks consist of schists, quartzites, and limestones. Some of the schists are fine-grained and thinly laminated, but others are coarsely banded micaceous rocks that are evidently altered sandstones. The most schistose and gneissoid rocks are those which border the batholith. Closely associated with this sedimentary series are dike rocks and lavas that have undergone the same metamorphism and are probably of the same age, which is supposed to be Carboniferous.

The common igneous rock of the area is a gray granite which has intruded the sedimentary rocks. It occurs over a large area and is probably a part of the Similkameen batholith. There are other igneous rocks of considerable areal extent, including a dark granite and an altered green porphyry. Dikes are abundant, particularly along the contact of the batholith with the metamorphic rocks; they include granite, diorite, pegmatite, and aplite, and probably represent the closing stage of igneous activity.

The ore deposits are principally of two types, quartz veins and disseminated or replacement deposits. The quartz veins are widely distributed throughout the area, but those of proved value are grouped

along the contact of the granite with the schists and gneisses. They are valuable for their lead-silver content and have yielded the principal output. The replacement deposits occur principally in a small area at the northern end of the Conconully district. They contain small amounts of copper and gold, but no ore has yet been produced commercially from them. R. W. S.

GEOLOGY.—*A reconnaissance of the Archean complex of the Granite Gorge, Grand Canyon, Arizona.* L. F. NOBLE and J. FRED. HUNTER. U. S. Geological Survey Professional Paper No. 98-I. Pp. 95–102, with 1 plate and 2 figures. 1916.

The Tonto platform on the south side of the Granite Gorge affords a magnificent but difficultly accessible cross-section through the Archean complex, 800 feet deep and 40 miles in length. These oldest rocks of the Grand Canyon were visited in twenty localities, 67 hand specimens were collected, and eight distinct groups of rocks were recognized. The exposures within these groups are described and the petrography of the specimens is given.

Estimated roughly, the gneisses (granite gneiss, hornblende gneiss, and metabasite) comprise 50 per cent of the rock exposed in the Granite Gorge; the mica schist, 30 per cent; the basic intrusives, 10 per cent; and the pink siliceous intrusives, 10 per cent. It is not improbable that the mica schists are in large part of sedimentary origin. It is believed that some of the wrinkled and contorted granite gneisses represent the original basement on which the schist series of metamorphosed sediments was laid down; that both before and after the deposition of the sediments there were long periods of complex intrusion, represented by amphibolites, granitic gneiss, metabasite, and metadiorite; that during and after the metamorphism of the schists and gneisses there were further intrusions of quartz diorite, gabbro, granite, pegmatite, and other rocks. It will probably be advisable, at some future time, to restrict the name "Vishnu schists," now used for the entire Archean complex, to the mica-schist series and give another name or names to the gneisses. J. F. H.

GEOLOGY.—*An anticlinal fold near Billings, Noble County, Oklahoma.* A. E. FATH. U. S. Geological Survey Bulletin 641-E. Pp. 121–138, with 1 plate. 1916.

During February, 1916, gas was struck in small quantities at shallow depths in a well being drilled a few miles southwest of Billings, Noble

County, Oklahoma. As this discovery was made at a place more than 20 miles distant from any other known oil and gas development, it has attracted considerable attention, which is justified by the presence of a large anticlinal fold, a type of structure that should be favorable for the accumulation of oil and gas. A description of the anticlinal fold and a discussion of the possibilities of developing an oil and gas field here are given. R. W. S.

PALEONTOLOGY.—*North American Upper Cretaceous corals of the genus Micrabacia.* LLOYD WILLIAM STEPHENSON. U. S. Geological Survey Professional Paper 98-J. Pp. 115–131, with 4 plates. 1916.

The report describes seven species and two varieties of corals of the genus *Micrabacia* from the United States, all but one of which, *M. americana* Meek and Hayden, are new. All are from the Atlantic and Gulf coastal plains, except *M. americana* and its variety *multicostata* from the Montana group of the Western Interior. Of the coastal-plain species, *M. cribraria* is from the upper part of the *Exogyra ponderosa* zone (North Carolina—Alabama), and the remainder are from the *Exogyra costata* zone of Maryland, Georgia, Mississippi, and Texas. The American species are compared with the type species of the genus, *M. coronula* Goldfuss, a description and figures of which are included, from Essen, Prussia. Each of the species has a small disc-shaped corallum, the largest, *M. rotatilis*, being only 9 mm. in diameter; in order to illustrate the characters it is necessary to magnify them four to eight times. L. W. S.

TECHNOLOGY.—*The recovery of paraffin and paper stock from waste paraffin paper.* W. H. SMITH. Bureau of Standards Technologic Paper No. 87. Pp. 4. 1916.

This paper describes a process for the recovery of the paraffin and paper stock from waste paraffin paper. The waste is pulped with exhaust steam in a vertical boiler. The wax rises to the surface and is drawn off with the hot water through a screen, the stock settling to the bottom of the boiler. The stock is transferred to a beating engine and further treated for the removal of the residual paraffin. Paper prepared from the recovered stock was free from wax and satisfactory in every respect. Practically all of the paper stock is recovered, but about ten per cent of the paraffin in the waste is lost during the process. W. H. S.

REFERENCES

Under this heading it is proposed to include, by author, title, and citation, references to all scientific papers published in or emanating from Washington. It is requested that authors cooperate with the editors by submitting titles promptly, following the style used below. These references are not intended to replace the more extended abstracts published elsewhere in this JOURNAL.

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MAMMALOGY

ALLEN, J. A. *The genotypes of Echimys and Loncheres.* Proceedings of the Biological Society of Washington, **29**: 205–206. September 22, 1916. (Argues that *E. spinosus* is the type of Echimys and *L. chrysurus* the type of Loncheres.—N. H.)

GABRIELSON, I. N. *A second record of* Nyctinomus depressus *for Iowa.* Proceedings of the Biological Society of Washington, **29**: 86. April 4, 1916. (A specimen of this southwestern species taken at Marshalltown.—N. H.)

GOLDMAN, E. A. *Notes on the genera* Isothrix *Wagner and* Phyllomys *Lund.* Proceedings of the Biological Society of Washington, **29**: 125–126. June 6, 1916. (Several species heretofore included in Isothrix are transferred to the genus Phyllomys.—N. H.)

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GOLDMAN, E. A. *A new vesper rat from Nicaragua.* Proceedings of the Biological Society of Washington, **29**: 155–156. September 6, 1916. (Describes *Nyctomys sumichrasti venustulus* from Greytown.—N. H.)

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HOLLISTER, N. *Shrews collected by the Congo expedition of the American Museum.* Bulletin of the American Museum of Natural History, **35**: 663–680, pls. 7–11. October 21, 1916. (Six new species of Crocidura and one of Sylvisorex from Belgian Congo.—N. H.)

HOLLISTER, N. *Three new murine rodents from Africa.* Smithsonian Miscellaneous Collections, **66**[10]: 1–3. October 26, 1916. (Describes new forms of Arvicanthis, Dasymys, and Mus.—N. H.)

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MILLER, G. S., JR. *Remains of two species of Capromys from ancient burial sites in Jamaica.* Proceedings of the Biological Society of Washington, **29**: 48. February 24, 1916. (A species apparently much like the form known from Little Swan Island is represented by bones; as well as remains of the previously known Jamaica species, *C. brownii*.—N. H.)

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TECHNOLOGY

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PROCEEDINGS OF THE ACADEMY AND AFFILIATED SOCIETIES

THE BOTANICAL SOCIETY OF WASHINGTON

The sixteenth annual meeting of the Botanical Society of Washington was held in Room 32 of the Bureau of Plant Industry building, U. S. Department of Agriculture, at 1.30 p.m., October 16, 1916, with W. E. SAFFORD acting chairman and H. L. SHANTZ acting secretary.

The minutes of the fifteenth annual meeting were read and approved and the report of the Executive Committee read and approved. The report of the Treasurer was read and an Auditing Committee, consisting of P. L. RICKER and G. P. VAN ESELTINE, appointed by the Chair.

The following officers were elected for the ensuing year: *President*, T. H. KEARNEY; *Vice-President*, EDGAR L. BROWN; *Recording Secretary*, CHARLES E. CHAMBLISS; *Corresponding Secretary*, H. L. SHANTZ; *Treasurer*, F. D. FARRELL.

Mr. A. S. HITCHCOCK was nominated by the society as Vice-President of the Washington Academy of Sciences.

The 115th regular meeting of the Society was held at the Cosmos Club Tuesday, November 7, 1916, at 8.00 p.m.

Mr. MICHAEL SHAPOVALOV, Dr. HOWARD G. MACMILLAN, Dr. JOSEPH ROSENBAUM, and Mr. F. E. MILLER were elected to membership in the Society.

Under Brief Notes and Reviews of Literature, Mr. W. T. SWINGLE called attention to a recent edition of an ancient Chinese work on botany, *The Cheng lei pen ts'ao*, originally published in 1108 A.D. Dr. A. T. TENAKA reviewed briefly a recently issued *Hand Book of Plant Diseases of Japan*, by Jinzo Matsumura.

The following papers were presented:

Notes on the life of John Bradbury: R. H. TRUE. Information concerning the life of this early naturalist and explorer of the Missouri Valley is very meager. A considerable addition has been gained from the correspondence carried on between Bradbury and Thomas Jefferson, who greatly influenced the course of Bradbury's life and work in this country. Bradbury's life, as gathered from this and other available sources, was sketched in outline.

Pathological problems in the distribution of perishable plant products: C. L. SHEAR and W. A. ORTON. The enormous losses in recent years caused by the deterioration and decay of fruits and vegetables between the field and the consumer have led to a more active interest in this subject and a desire on the part of those most directly affected to have the causes and means of prevention determined. In most cases fungi are the active agents in causing the destruction of such products, and the problem is primarily pathological. In order to devise means of avoiding these losses, a thorough knowledge of all the factors and conditions involved must be obtained. Each fruit and vegetable has its own peculiarities and its own parasites. In some cases the cause of loss may be traced to the field, and in others to conditions of transportation and handling. In any specific case the cause and responsibility for the loss can be determined only by careful investigation of all the facts. Specific cases of losses of strawberries, peaches, cranberries, watermelons, tomatoes, and potatoes were cited to indicate the complexity of the problems and the danger of drawing any general conclusions from insufficient data. It was shown that the means of preventing such losses will depend upon the nature of the cause or causes, as determined by a knowledge of all the factors in any particular case.

H. L. SHANTZ, *Corresponding Secretary.*

BIOLOGICAL SOCIETY OF WASHINGTON

The 561st meeting of the Society was held at the Cosmos Club, Saturday, December 2, 1916; called to order by President HAY at 8 p.m. with 50 persons in attendance.

The following program was presented:

W. P. HAY: *The discovery of an interesting new tardigrade.*

Professor Hay gave a brief description of a tardigrade belonging to the genus *Batillipes*, discovered by him some years ago at Beaufort, N. C. It is closely related to *B. mirus* Richters but differs from that species in a number of important characters. The structure and relationship of the tardigrades were discussed and the conclusion was reached that *Batillipes*, in spite of its evident specialization along certain lines, is probably the most primitive genus of the group. From *Batillipes* through *Halechiniscus* to *Oreella* and *Echiniscus* was suggested as one line of development, while from *Echiniscoides* through *Milnesium* to *Macrobiotus* and *Diphascon* appears to be another. The genus *Tetrakentron*, with its single species *T. synaptae*, shows a high degree of specialization due to parasitism, and *Microlyda* is probably the larval form of *Halechiniscus*.

Attention was called to the habitat of the ten animalcules belonging to these genera. Five of them, *Batillipes*, *Halechiniscus*, *Microlyda*, *Tetrakentron*, and *Echiniscoides* are marine; *Echiniscus* and *Oreella* are strictly terrestrial; *Macrobiotus* is mostly terrestrial or lacustrine, but is represented in salt water by at least two species; *Diphascon* is

terrestrial and lacustrine. The fact that the majority of the genera are marine and that this list includes all the more primitive genera points strongly to a marine origin for the group. It also supports the idea advanced by Professor Richters in 1909 that the tardigrades are probably most closely related to the chaetopod worms and should be removed from the class Arachnida in or near which the group is usually placed in our zoological text books. Professor Hay's communication was illustrated by charts and diagrams.

J. N. ROSE: *Exhibition of Venezuelan plants and fruits.*

Dr. Rose had on exhibition a large tableful of fruits, fruit products, and various articles made of parts of Venezuelan plants. He explained their use and described the plants from which they were obtained. The specimens were obtained for the most part in the vicinity of La Guaira and Caracas. Dr. Rose's communication was discussed by Messrs. H. PITTIER, M. W. LYON, Jr., and others.

M. W. LYON, JR.: *Poisonous snakes.*

Dr. Lyon gave an account of the various specific substances that have been found in snake venoms, and outlined their modes of action on the various tissues of bitten animals. He spoke of the various antiserums that have been prepared against these venoms, and their therapeutic uses. He called attention also to the non-specific treatment of snakebites in the light of modern statistics and experiments. He then gave a brief outline of the classification of venomous snakes, and discussed their geographic distribution and the development and structure of the poison gland and fang. His communication was illustrated by lantern slide views of skulls, glands, and fangs of poisonous snakes, of types of poisonous snakes, and of some of the histological changes caused by snake venom. It was discussed by Messrs. A. A. DOOLITTLE, H. PITTIER, H. M. SMITH, H. E. AMES, and T. E. WILCOX.

The 562d regular and the 37th annual meeting of the Society was held at the Cosmos Club, Saturday, December 16, 1916; called to order by President HAY at 8 p.m. with 23 persons present.

Annual reports of officers and committees were submitted. Election of officers for the year 1917 resulted as follows: *President*, W. P. HAY; *Vice-presidents*, J. N. ROSE, A. D. HOPKINS, HUGH M. SMITH, VERNON BAILEY; *Recording Secretary*, M. W. LYON, JR.; *Corresponding Secretary*, W. L. MCATEE; *Treasurer*, NED DEARBORN; *Members of Council*, N. HOLLISTER, J. W. GIDLEY, WILLIAM PALMER, ALEX. WETMORE, E. A. GOLDMAN. President HAY was nominated as vice-president of the Washington Academy of Sciences.

Ex-president B. W. EVERMANN then gave an illustrated lecture regarding the present condition of the museum of the California Academy of Science and its aims and aspirations. This was discussed by Messrs. E. W. NELSON and VERNON BAILEY.

M. W. LYON, JR., *Recording Secretary.*

THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

The 500th meeting of the Society was held at the New National Museum, October 17, 1916, at 4.30 p.m. Dr. WALTER HOUGH, of the National Museum, read a paper on *Ancient pit dwellers in New Mexico.*

Dr. Hough said that remains of pit dwellings were indicated on the site of stone ruins explored in western Socorro County, New Mexico, several years ago and that a large cluster of such dwellings not connected with stone ruins was observed subsequently near Luna, in Socorro County. The site was productive of interesting results during an exploration for the Bureau of American Ethnology last summer. The field in which the remains occur had been smoothed over by natural agencies and the positions of the houses were shown only by the stronger growth of vegetation over circular areas, this defining the pits. Some of the pits were cleared, and it was found that they were from 12 to 14 feet in diameter and 5½ feet deep. Remains of roof clay and charred posts and beams indicate that the roof was supported on posts placed around the periphery of the pit. It is thus probable that more than half of the house was underground, and perhaps the position of the walls above ground were banked. The floor arrangement shows a fireplace near the center, a metate and grinding stones near the fire. In one of the pits a burnt clay wall fireplace was found. Adjoining the pits was a rectangular house also rooted with clay. Here were found numerous grinding stones, baking slabs, and remains of pottery, these being about a foot under the surface loam. This house was an open air cooking and mealing shed. Near the first pit excavated was a cemetery of infants; no remains of adults have yet been found on the site.

A dance amphitheater which was about 100 feet in diameter and 10 feet deep lies on the east side of the site. It has been filled by natural agencies with about 5 feet of fire-blackened débris and in it large pine trees have matured. It is on the bank of the former and larger channel of a living stream which traverses the eastern edge of the site. The specimens found are crude metates, rubbing stones, hammer stones, baking slabs, etc.; pottery of Pueblo type, decorated and undecorated and of some crudity; a few bone awls and small obsidian arrowheads. No stone axes were found.

Dr. Hough presented the problem as he found it, and hesitated as yet to pronounce upon the affiliations of the people who constructed the pit houses.

The 501st meeting of the Society was held in the Lecture Hall of the Public Library, on Tuesday evening, November 7, 1916, at 8 o'clock. The speaker was Mr. W. E. SAFFORD, of the Bureau of Plant Industry, U. S. Department of Agriculture. His subject was *Magic plants of the ancient Americans.* The paper was illustrated with lantern slides.

Mr. Safford said that the practice of magic was widely spread in both North and South America in pre-Columbian times, and in connection with it certain plants, principally those having narcotic properties, were used ceremonially, often as incense, or to produce hallucinations, to call up the spirits of the dead, and to expel evil spirits from the sick and insane. The priest of the Temple of the Sun at Sagomozo, in the Andes of South America, prophesied and revealed hidden treasures while in a state of frenzy caused by the seeds of a tree datura (*Brugmansia sanguinea*). This recalls similar practices of the priestesses of the oracle at Delphi. Another Peruvian plant with marvelous properties described by early explorers was *Erythroxylon Coca*, from which the valuable alkaloid cocaine is now obtained. Bags of its leaves accompanied by little gourds containing lime were found by the author in many graves near the Peruvian coast, hanging about the necks of the mummified remains of the dead. On the opposite coast of South America, or rather in Paraguay, grew the highly esteemed *Ilex paraguariensis*, or *yerba mate*. Closely allied to it is the *Ilex vomitoria* of the southeastern United States, from which the Indians made the famous "black drink," used ceremonially as a magic physic, which purged them from evil and which was used also in initiating their youths into manhood. Professional priests, or necromancers, were encountered by Columbus and his companions on the island of Hispaniola, who induced intoxication and called up their *zemi*, or gods, by means of a narcotic snuff, called *cohoba*, inhaled through the nostrils by means of a bifurcated tube. This snuff, hitherto believed to have been tobacco, has been identified recently by the author as the powdered seeds of a Mimosa-like tree, *Piptadenia peregrina*, still used in a similar way by various South American tribes of Indians, by some of whom an infusion of the seeds is also used to induce intoxication, administered as an enema by means of a pear-shaped syringe of caoutchouc. In Mexico, the early missionaries, who were called upon to stamp out the practice of witchcraft, found that the Aztecs paid divine honors to various plants, especially to *huauhtli* (a white-seeded Amaranthus); *ololiuhqui* (a Datura); *peyotl* (a spineless cactus, *Lophophora Williamsii*) also called *teonanacatl*, or "Sacred Mushroom;" and *picietl* (tobacco). Of *huauhtli* seeds, ground to a paste with the syrup of maguey, images were made and adored, and afterwards broken into fragments and served as a kind of communion. This seed was produced in such quantities that it was used in paying tribute to Montezuma, at the time of the Conquest. The *ololiuhqui* was regarded as divine, and it was considered a holy task to sweep the ground where it grew. Its spirit, addressed as the Green Woman (*Xoxouhqui Cihuatl*), was invoked to expel certain diseases and to overcome weaker and inferior spirits in possession of a sick person. It is interesting to note that the use of the *ololiuhqui*, or *toloatzin*, as it was also called (*Datura meteloides*), still prevails among the Zuñi Indians of New Mexico, the Pai-Utes, and several tribes of southern California in certain religious and ceremonial practices, especially in initiating youths into the status

of manhood. The *peyotl*, or *teonanacatl*, called by Bancroft the "flesh of the gods," was used by the Aztecs in nocturnal feasts, very much as it is still used by Indians of the Mexican Sierra Madre and by certain tribes of the United States, who believe the visions induced by it to be supernatural. In ancient times a supply of this little narcotic plant was obtained by runners especially consecrated for the purpose, and its gathering was attended by a most formal ceremony. At the present day it is sent from the locality where it grows, along the Rio Grande, by means of parcel post. Lastly, the ceremonial and religious use of *picietl*, or tobacco, goes back to remote antiquity. No other narcotic plant, perhaps, has become so widely spread or so generally used and beloved by its votaries. Though of subtropical origin its cultivation had extended before the Discovery as far north as the St. Lawrence River. Beautiful pipes of many forms, representing birds, mammals, human heads, etc. have been discovered in Indian mounds near the native city of the speaker, Chillicothe, Ross County, Ohio; and more recently in Scioto county farther to the south.

In addition to the above plants may be mentioned a certain small scarlet bean, the seed of *Sophora secundiflora*, endemic in northern Mexico and southern Texas. This also has narcotic properties, and was so much sought after by certain tribes of Indians that they have been known to exchange a pony for a string of the beans 6 feet in length. In one of the secret societies of the Iowa Indians this bean is used in the initiating ceremonial; the beans are carried as charms or amulets by the members of the society, just as in western Mexico fragments of the *peyotl*, and in southern California parts of the Datura, are carried by their votaries, who believe them to be efficacious against danger and to bring good luck in hunting and war. It is interesting to note a similar practice in the Old World of carrying the root of Mandragora (or a substitute for it) as an amulet; but most interesting of all is the similarity between the beliefs and practices of the inhabitants of the Old World and the New, in connection with narcotic and other plants held to possess magic properties. The lantern slides used to illustrate the lecture were photographs of the various magic plants discussed.

This paper was discussed by Mr. JAMES MOONEY, who for a number of years has given special study to the subject of *peyotl*. Mr. Mooney defended those who are devoted to the peyotl ceremony and claimed that, in most cases, the assertions made against the plant and its users are based upon ignorance of the facts and are without foundation.

The 502nd meeting of the Society was held at the New National Museum on Tuesday afternoon, November 21, 1916, at 4.30 o'clock. Mr. NEIL M. JUDD, of the U. S. National Museum, presented a paper on *New types of Pueblo ruins found in western Utah*, illustrating his paper with chalk drawings.

Mr. Judd described a recent archeological reconnaissance of western Utah conducted under the auspices of the Bureau of American Ethnology, stating that this resulted in the discovery of two types of pre-

historic habitations not previously reported from the Southwest. The first of these was circular in form and was made by leaning logs against cross-pieces supported by four uprights which surrounded a central fire-place. Willows, grass, and clay, in succession, covered the logs. Houses of the second type, occurring usually in groups forming villages, were rectangular in shape and constructed entirely of adobe. A small series of unattached cliff-dwellings, exhibiting certain features common both to structures of this second type and to stone-walled houses south and east of the Rio Colorado, was also described. A careful study of the lesser artifacts recovered from both types of western Utah ruins indicates a close cultural relationship between their respective builders and the inhabitants of prehistoric structures in other sections of the Southwest.

In a discussion of the paper Dr. J. W. FEWKES called attention to the desirability of a more accurate definition of what archeologists mean by a "pueblo." He pointed out that the term is sometimes used loosely to include all kinds of ruined stone buildings in the Southwest. Inasmuch as the pueblo culture area owes its name to characteristic buildings or pueblos, he suggested that the term be limited to terraced, congested community buildings with ceremonial rooms or kivas. If this suggestion were accepted by archeologists, many ruins on the periphery of the so-called Pueblo area would have to be classified as belonging to a prepuebloan phase, or not regarded as pueblos at all.

The 503rd meeting of the Society was held in the Lecture Hall of the Public Library on Tuesday evening, December 5, 1916, at 8 o'clock. At this meeting Prof. W. H. HOLMES, of the U. S. National Museum, delivered an address on *Outlines of American aboriginal history*, illustrated with lantern slides.

Introducing his subject, Professor Holmes said it is agreed that the human race is a unit, and that it follows, therefore, that there was but one cradle and that man spread from this over the world. The early chapters of human history must always remain obscure, although evidence has been found carrying the story far back into the remote past. It was the purpose of the speaker to indicate briefly the probable course taken by the human race in spreading from the Asiatic cradle to the New World, and also to indicate the causes and course of cultural development in the various centers of American occupancy and to suggest the causes of decline.

The earliest known traces of man (or man-like being) have been found on the island of Java. In the nature of things, it was a long time before he wandered far from his primeval home. He had to acquire the arts of the hunter and fisher before he could reach the far north and it was doubtless by way of Bering Strait that he reached the New World. Portraits were shown of the various peoples whose ancestors may have been concerned in these ancient migrations—natives of Tibet, China, and Siberia, the Eskimo, the Sioux, the Zuñi, and other typical American Indians; and attention was directed to the

practical identity of these types. Referring to the development of culture in America it was shown that no culture above the hunter-fisher stage ever passed through the Bering gateway. All culture of higher grade is, therefore, American. As the early immigrants reached the more favorable localities of the continent, they engaged in agriculture and became sedentary. This condition led to the development of the simple arts, industries, and institutions belonging to this phase of progress. It was asked, How then do we account for the vast works in the way of temples, pyramids, and tombs, and the vast body of products of the sculptor's art, of highly embellished pottery, textiles, and metallurgy? It was shown that all were due to the dynamic forces of religion manifested through the all-powerful shamanistic classes, who sought above all things to honor the gods and to glorify themselves. But, it was asked, Why are the once splendid cities now in ruin? The reasons are readily found: The energies of the people were broken down by the ever increasing load of super-essential activities. The system which permitted over-growth of these highest manifestations of culture had within itself the germs of disaster.

Numerous slides illustrating various wonderful products of sculptural and architectural genius developed under the absolute control of the Mayan shamanistic priesthood were shown.

The paper was discussed by Dr. E. HEWETT, of Santa Fe, N. M., Mr. S. G. MORLEY, of Cambridge, Mass., and Dr. H. J. SPINDEN, of New York. Dr. Hewett suggested the influence of environment on the cultural development of a race, citing the discovery of metal by the early inhabitants of Europe and its use in making weapons. Mr. Morley spoke of the Maya hieroglyphs, and Dr. Spinden discussed the culture which preceded that of the Maya in Central America, traces of the agricultural period remaining in crude figurines, and that of the religious period in effigies of serpents and of grotesque gods.

The 504th meeting of the Society was held at the New National Museum, December 19, 1916 at 4.30 p.m. Dr. TRUMAN MICHELSON, of the Bureau of American Ethnology, presented a paper entitled *Notes on the Peoria Indians.*

Dr. Michelson said that the Peoria Indians have practically lost their ethnology, in the strictest sense of the word, although their language and folklore still remain. A study of these shows very clearly that the Peoria Indians have had two associations, the older and more intimate association being with the Ojibwa group of central Algonkins and the more recent with the Sauk, Fox, and Kickapoo. The terms of relationship support this view, as do the historical facts.

The speaker then showed by means of a blackboard chart the system of consanguinity among the Peoria. In this way it was demonstrated that two factors were involved, i.e., the gentile organization and blood consanguinity.

The paper was followed by a general and interesting discussion. Prof. W. H. HOLMES mentioned the old quarries in northeastern Okla-

homa, near the present location of the Peoria Indians, and Dr. ALEŠ HRDLIČKA noted the importance of definite recording of the geographic distribution of Indian tribes. In reply to a question by Mr. F. W. HODGE the speaker expressed the opinion that archeological research would throw light on the early material culture of the Peoria. Dr. J. R. SWANTON noted that the Indians of the Northwest coast have a myth similar to one related by the speaker, in which bones thrown into the water are said to "come to life." In the legend of the coast Indians the bones are those of a salmon, while among the Peoria the bones are those of a beaver. In response Dr. Michelson stated that the form of this legend which mentions the beaver is limited to a small area.

FRANCES DENSMORE, *Secretary.*